Integrated and Participatory Approach to Revegetate Village Ecosystems in Karnataka for Carbon Sink Enhancement and Biodiversity Conservation through Sustained Livelihood Development

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Karnataka Forest Department
&
Centre for Ecological Sciences, IISc., Bangalore

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PROJECT BRIEF

PROJECT TITLE : Integrated and Participatory Approach to Revegetate Village Ecosystems in Karnataka for Carbon Sink Enhancement and Biodiversity Conservation through Sustained Livelihood Development
DURATION : 5 Years
IMPLEMENTING AGENCY : UNDP
EXECUTING AGENCY : Karnataka Forest Department
REQUESTING COUNTRY : India
ELIGIBILITY : India ratified the FCCC on 1 November 1993
GEF FOCAL AREA : Multiple Focal Areas: Biodiversity, Climate Change, International Waters, Land Degradation
OPERATIONAL PROGRAMME : OP 12. Integrated Ecosystem Management

1. SUMMARY: The project aims at development, implementation and large-scale dissemination of an integrated village ecosystem revegetation package for enhancing carbon sinks and biodiversity along with improvement in livelihoods and incomes of local communities. The project components (i) developing an integrated village ecosystem revegetation package for the Western Ghats region, in consultation withthe relevant stakeholders, for different land components, (ii) implementing the revegetation package in 90 villages of three forest ecosystems of the Western Ghats region, (iii) developing institutions and enhancing capacity to implement, protect and manage the revegetation programme, (iv) developing participatory vegetation monitoring for biodiversity conservation, and (v) developing and disseminating the integrated village ecosystem revegetation approach in other parts of the Western Ghats region.

The project will be implemented in three clusters of 30 contiguous villages each in the coastal, hilly and dryland or plain forest ecosystems of Kanara forest circle (Uttara Kannada district) of the Western Ghats region, Karnataka, India.

2. COSTS AND FINANCING (MILLION US $)

GEF : $ 6.15 million

Co-Financing :
Government of Karnataka : $ 1.38 million
Bilateral : $ 1.17 million
Beneficiaries' Contribution : $ 0.234 million

Total Project Cost : $ 8.934 million

1. BACKGROUND AND CONTEXT

1.1 Background

India is a large tropical country with a population of over one billion and a population density of about 300/km^2. The rural population accounting for 70% of the total is spread over 0.5 million villages in India. Nearly 200,000 villages are in and aroundthe forests (FSI, 1999). The area under forest cover in India is about 64 Mha with about 59% of the area under dense forests (>40% crown cover). The per capita forest area (0.1 ha/capita) is one of the lowest in the tropical world. The large rural population as well as forest dwellers accounting for over 60 million depend extensively on forests for meeting their biomass needs and livelihoods.

India has implemented several programmes for forest conservation, reforestation, afforestation and biomass conservation. Despite these efforts, the pressure on the forests, biodiversity and biomass (or carbon) stock is under threat, due to growing population. The focus of the State Forest Departments has been largely on conserving the existing forests and afforesting degraded forest lands.

The Government of India has also focussed on conservation and developmental programmes in ecologically critical areas such as the Western Ghats, Himalayan Mountain Ecosystems and the Eastern Ghats. Studies in the Western Ghats have shown that the forest area, the biodiversity as well as the carbon sinks in the forest and village ecosystems have all been subjected to degradation. In the proposed project, we plan to assess the current threats, the programmes and policies of the Forest Department and activities that could assist in conservation of biodiversity and enhancing forest regeneration and carbon sinks in forests as well as the village ecosystems in the Western Ghats region.

1.2 Context

Western Ghats is one of the mega diversity 'hot spots' in India, covering a geographic area of nearly 14 Mha, of which, 5.3 Mha or 38% is under forests. This stretch harbors a large diversity of flowering plants (3500 species), fauna (48 genera of mammals, 275 genera of birds and 60 species of reptiles) and microorganisms, including some that are endemic to the region. This vast diversity supports livelihoods of large proportion of populace, living in and around the forests. Further, it is being subjected to intensive development apart from extension of agriculture and extraction of forest products. Thus, the decline inthe forest area and its degradation is felt in terms of decreased biomass availability such as fuelwood, fodder and other Non-Wood Forest Products. Western Ghats being a hilly region captures precipitation and the valley is used for cultivation of horticultural plantation crops and the slopes are cultivated with coffee and tea. Apart from cultivation in valley and slopes, these hilly regions are potential areas for generating electricity through hydroelectric projects or irrigation project. Thus, the forest area is therefore under threat.

In order to enhance biomass supply to meet the needs of local communities and to maintain ecological balance of the area, governmental and international agencies have supported afforestation programmes in the region for the last several years. The National Forest Policy (1988) has prescribed that the overall forest cover in the country should be 33% with 30% cover in plains and 60% in hilly areas. Currently, only 35.6% of the total geographic area is under forest cover in the Western Ghats (FSI, 1997).

The Western Ghats region is undergoing rapid transformation and it is well known that extensive deforestation has taken place during the last 100 years (Bawa and Menon, 1997). Forests of the Western Ghats have suffered on account of expansion of hill slope agriculture (coffee and cardamom plantations, legumes and millets cultivation) and valley agriculture (areca and coconut orchards, rubber plantations, paddy cultivation in the valleys). Shifting cultivation, which was prevalent in the early British period was banned during the mid-nineteenth century and hence is no longer major cause of forest degradation. Clear felling, grazing and encroachments in Western Ghats have also led to degradation.

In order to achieve the national goal of maintaining 33% forest cover and more specifically to enhance the forest cover in hilly regions to 60%, many afforestation programmes were launched. One such important programme launched in the Western Ghats was the Social Forestry programme during the 1980s and the Joint Forest Management programme through community participation during the 1990s. The Social Forestry programme in the Western Ghats region was aimed at revegetating degraded forest lands. The Joint Forest Management programme aims to revegetate and regenerate degraded forests through community participation and share the benefits.

Though an appreciable extent of afforestation was accomplished to meet the local requirements of small timber, fuelwood and to a greater extent, the raw material for industries, a gap between demand and supply still persists. This is primarily because the afforestation programmes were government-driven with the focus on fuelwood plantations. The species planted only met the requirements of forest-based industries and fuelwood. As mentioned earlier, the livelihoods of communities are closely linked to the availability and access to a diverse range of forest products, for meeting the subsistence as well as cash needs of rural economy. For instance, the extent of families gathering Non-Wood Forest Products varied from 50 to 75% of the total households in the Western Ghats. The number of species gathered varied from 95 to 119 in Western Ghats. The annual income derived from Non-Wood Forest Products ranged between Rs. 1156 to Rs. 1681 per household (Ravindranath *et al.*, 1997).

The threats to carbon sinks and biodiversity in the Western Ghats region include:

- Expansion of crop area into forest and non-forest lands (pastures and so on)
- Conversion of forest lands to intensive gardens, infrastructure
- Non-sustainable extraction of fuelwood, leaf manure and Non-Wood Forest Products from different land-use components, particularly reserve and community forests
- Degradation of pastures due to over-grazing
- Extraction of timber for local use as well as for export to urban and industrial sectors
- Felling/logging of trees outside forests to meet domestic and industrial fuelwood and timber needs due to the legal ban on felling/logging from reserve forests.

1.3 Forest Conservation, Reforestation and Afforestation Programmes in the Western Ghats

Government of India has passed an effective Forest Conservation Act in 1980 and there have been resolutions subsequently, aimed at enforcing forest conservation practices in the reserve forest areas. Protection and conservation of reserve forests is the sole responsibility of the State Forest Department. The Forest Department has an administrative structure to protect and monitor the activities in the reserve forests. However, due to increased pressure on forests, the State Forest Department is unable to effectively protect and sustainably manage the reserve forests.

Afforestation and reforestation programmes are being currently implemented in the Kanara forest circle (10 291 km^2), which is the project area; annually, about 6000 ha are afforested. The afforestation programme is being largely planned, implemented and managed by the Forest Department, with minimal participation by local communities. It is dominated by fuelwood and timber species such as *Acacia auriculiformis*, *Casuarina equisetifolia* and teak and is largely restricted to degraded reserve forests and community forest lands. A part of the fuelwood and poles obtained under the Social Forestry programme are distributed or sold to the local communities.

Involvement of local communities in forest management: The Karnataka State Forest Department initiated Joint Forest Planning and Management in Kanara circle to formally involve the local communities in protection, planning and implementation of afforestation programmes. Under this programme, 362 (out of 1300 villages) Village Forest Committees have been formed. Preliminary assessments of the Joint Forest Management programme have shown that the involvement of local communities was not sustained and that they had limited technical capacity, and management and financial powers. The involvement of local communities was largely limited to the planning process, with the Forest Department taking all the decisions on financial and technical matters, including complete protection of the plantations during the first three years.

1.4 Carbon Sink, Biodiversity and Flow of Benefits to Communities

The carbon sink, biodiversity in the forest ecosystems and forest land ecosystems are under threat, due to increasing human and livestock pressure as well as non-sustainable extraction and grazing practices. The implications of current approaches and practices of forest conservation and afforestation programmes in the forests and other village land categories are;

- Decline in biodiversity
- Reduction in forest carbon sink
- Focus on only forest areas and exclusion of non-forest land components in conservation and regeneration
- Biodiversity conservation not being the focus of afforestation programmes
- Regulated access to local communities to commercialized Non-Wood Forest Products
- Limited technical and institutional capacity at the village level, coupled with inadequate administrative and financial powers to the village communities and local institutions

- Dominance of fuelwood and exotic tree species in the afforestation programmes
- Non-sustainable extraction of commercialized Non-Wood Forest Products and low value addition, leading to low incomes
- Non-realization of the market potential of several Non-Wood Forest Products due to absence of institutions, and
- Shortage of fuelwood and timber, and reduction in supply of Non-Wood Forest Products.

The growing pressure on forests and pasture resources and absence of strong community institutions will continue to have an adverse impact on carbon sinks, biodiversity and a sustained flow of benefits to local communities. The current forest conservation and afforestation programmes are inadequate because they focus largely on forestlands. There is need to develop an alternative integrated strategy, where the focus is on the village ecosystem as a whole, covering forest as well as non-forest land components such as crop lands, village commons, grazing lands, homestead gardens, areas around water bodies, temples, schools and so on.

2. PROJECT OBJECTIVES AND RATIONALE

2.1 Objectives

The project aims at developing, implementing and disseminating an integrated and participatory approach to revegetation of village ecosystems, for enhancing carbon sinks, conserving biodiversity and enhancing sustained flow of benefits to the local communities.

The specific objectives of the proposed project are;

1. To enhance carbon stock and biodiversity in different land components of village ecosystems in the Western Ghats region
2. To enhance bio-resource supply to village communities to improve incomes and livelihoods
3. To develop and disseminate an integrated village ecosystem revegetation package to different regions of the Western Ghats
4. To develop sustainable participatory institutions and build capacity, and
5. Participatory Monitoring for Biodiversity Conservation.

2.2 Local, national and global objectives

Local objectives Local communities, particularly women, the landless and artisans depend on vegetation resources extensively for their biomass needs and livelihoods. The Integrated Village Ecosystem Revegetation Programme, by revegetating all the potential land categories and land areas, aims at enhancing the supply and availability of diverse biomass resources; timber, fuelwood, grass, Non-Wood Forest Products such as medicinal plants, fruits, nuts, honey, bamboo, gum, leaves and seeds. Enhanced availability of biomass also leads to enhanced employment and income in particular to women, landless and artisans. Value addition activities to Non-Wood Forest Products also enhance the income of rural households. Enhanced leaf manure supply due to enhanced biomass in the village ecosystem increases crop and garden productivity sustainably. Finally, capacity of the local communities and institutions will be enhanced to manage forestry activities.

National objectives: The project aims to enhance the biomass resource supply not only to the project villages but also to adjacent regions as the incremental revegetation is expected to generate surplus biomass resources for the market. The project also aims to reduce the pressure on natural forests by enhancing the supply of biomass resources from non-forest areas in the village ecosystem. Revegetation and sustainable vegetation management contributes to protection of watersheds and river catchment areas.

Global objectives Firstly, the project aims to enhance the carbon sinks in vegetation and soil in the forest and non-forest land categories such as crop lands through agro-forestry, silvi-pasture in village commons, homestead gardens, regeneration of temple forests and planting around water bodies and road sides. Secondly, the project aims to enhance the biodiversity of ecologically sensitive Western Ghats forest as well as non-forest land components through protection, conservation, planting and sustainable management. Thirdly, land degradation will be halted and land reclamation promoted.

2.3 Rationale for GEF funding

Forest management practices under the current forest conservation and afforestation programmes are known to be inadequate for conserving the carbon sinks and biodiversity and for sustaining the incomes of forest-dependent communities. The project aims to overcome the technical, institutional and financial barriers for conserving and enhancing carbon sinks, conserving biodiversity and enhancing rural incomes. Some of the technical, institutional and financial interventions that require funding from GEF are as follows:

- Adoption of integrated village ecosystem concept, recognizing the inter linkages between different land components and the human and livestock systems.
- Revegetation of forest as well as non-forest land categories. Revegetation activities on the non-forest land categories would involve agroforestry on crop lands, silvi-pasture in village commons, homestead gardens, regeneration of temple forests and planting around water bodies and road sides. In the baseline situation, the focus of afforestation is only on degraded forest lands.
- Implementing and demonstrating the synergy between carbon sink enhancement and biodiversity conservation along with enhanced biomass resource availability. In the baseline situation, the afforestation programme is aimed largely at meeting fuelwood needs and is dominated by *Acacia auriculiformis*.
- Enhancing the carbon sinks and biodiversity in village ecosystems for local and global benefits.
- Promoting value-addition through installation of processing facilities and market development of Non-Wood Forest Products to increase the incomes and sustain the stakes of local communities.
- Participation of all the stakeholders for different relevant land categories such as women, artisans, temple committees (for temples), school management committees (for schools), households (for homestead gardens) and farmers

(for croplands). In the baseline situation, there is a Village Forest Committee with all adult men and women as members, often dominated by landed and affluent men of the village.

- Sustained capacity building activities for all the stakeholders such as women, farmers, school teachers, priests, local water management committees, forest management committees and so on. Currently, capacity building activities are restricted to the President and a few members of the Management Committee of the Village Forest Committee, with no follow up to sustain the capacity built.
- Development of integrated village ecosystem revegetation package to other regions of the Western Ghats.
- Development of land category-stakeholder specific revegetation package, in consultation with respective stakeholders (such as the farmers, temple authorities and so on).
- Sustaining carbon sinks and biodiversity enhancement through institutional capacity building and participation of stakeholders.
- Dissemination of integrated village ecosystem revegetation package and approach, to other regions of the Western Ghats.

2.4 Project Location

The project area is located in Uttara Kannada district, Western Ghats region of Karnataka, India. The district can be demarcated into three regions, the coastal, upghat (hilly) and plains. The coastal region is characterized by high rainfall, relatively low forest cover and high population density. The forest dependency is large and hence great potential for revegetation exists. The forests are dominated by evergreen and semi-evergreen forest types. The forests are highly degraded due to various developmental activities and human and livestock population. The upghat or hilly region comprises of undulating terrain with a lower density of population, practicing garden agriculture. The area comprises predominantly of evergreen and semi-evergreen forests, with high rainfall. The plains are regions of low rainfall comprising deciduous and moist deciduous forests. The people in the entire district are largely dependent on forests for their subsistence and commercial livelihood needs. Although the area is small, 10,000 sq km there is a great diversity in land use and forest use patterns. This would help develop different revegetation packages depending on the needs and ecological zones of the district. Awareness of the people in this area about environmental issues is high and success in this area would help spread the concept.

3. PROJECT OBJECTIVES, OUTPUTS AND ACTIVITY

The project objectives, expected outputs, and activities to achieve each objective are outlined below.

3.1 Objective 1: To enhance carbon stock and biodiversity in different land components of village ecosystems in the Western Ghats region

The conversion of forest land for various non-forestry uses has led to degradation of forests and reduced forest cover in the district. These conversions have put more pressure on the remaining forest. The project aims to enhance the carbon stock and biodiversity in different land components of the village in order to reduce reliance of the local community on the forests

*3.1.1 **Output 1:** Revegetation package developed through participatory planning*: In order to enhance the carbon stock and the biodiversity, a revegetation package will be developed keeping in view the needs of local people and choice of species, through participatory planning. The activities that will be undertaken to achieve this output are as follows:

1 1 Field survey of project villages including a land survey, soil and hydrological survey, and household survey to develop village resource maps
1.2 Develop carbon and vegetation biodiversity maps of the village
1 3 Prepare a comprehensive resource use and resource development plan for the villages through participatory appraisal
1.4 Develop location (land category) and stakeholder-specific revegetation plan for each village.

*3.1.2 **Output 2:** Carbon sink and biodiversity of village ecosystems conserved and enhanced*: The current practices of ecosystem development are inadequate to enhance the productivity of the forests and plantations of the area. Therefore there is an urgent need to enhance the biodiversity and biomass productivity through the following activities:

2.1 Establishment of nurseries for facilitating the distribution of quality seedlings
2.2 Undertake land preparation and soil moisture conservation measures
2.3 Distribution of quality seedlings such as clones, grafts for planting
2.4 Protection of forests and after care
2.5 Promotion of natural regeneration in natural forests
2.6 Organization and infrastructure development for effective management of forest and non-forest resources

3.2 Objective 2: To enhance bio-resource supply to village communities to improve incomes and livelihoods

It is important to develop bio-resources for people to reduce their reliance on the forests and generate employment and income for better livelihood. Therefore the project seeks to achieve the following outputs.

*3.2.1 **Output 1:** Sustainable extraction package for fuelwood and Non-Wood Forest Products prepared*: Sustainable extraction of vegetation resources is a key issue in the development of a resource base and to regenerate resources. The following activities will be undertaken to achieve this output.

1.1 Develop a sustainable management (extraction) practices package
1.2 Train the community for sustainable extraction of fuelwood and Non-Wood Forest Products

*3.2.2 **Output 2:** Employment and income enhanced*: Apart from learning sustainable extraction, it is equally important to generate income and employment to engage the interest of the local people in sustaining the carbon sink and biodiversity. The following activities will be undertaken to achieve this goal:

2.1 Assessment of Non-Wood Forest Product processing potential
2.2 Assessment of market infrastructure

2.3 Development of market network
2.4 Processing facilities for Non-Wood Forest Products and medicinal plants to add value
2.5 Enhancement of milk production through improved cattle management

3.3.3 Output 3: *Quality of life improved and alternate livelihood systems provided*: Fuelwood extraction practices and its use in low-efficient traditional cookstoves, leads to drudgery and low quality of life to women, apart from degrading the vegetation resources. Fuelwood-conserving biogas and efficient cookstoves will be disseminated. Drudgery associated with grazing as well as low milk productivity will be addressed in the project to increase incomes and the quality of life.

3.1 Evaluation of current fuelwood consumption patterns
3.2 Installation of biogas plants
3.3 Installation of fuel-efficient stoves and promotion of renewable wood substitutes
3.4 Evaluation of current grazing systems and provision of alternatives

3.3 Objective 3: To develop and disseminate an integrated village ecosystem revegetation package to different regions of the Western Ghats

The project aims to replicate the integrated and participatory village ecosystem revegetation concept and programme to other regions of the Western Ghats. Revegetation plans specific to ecosystems, socio-economic situations and the needs of stakeholders will be developed and disseminated across different districts of the Western Ghats region in Karnataka.

3.3.1 Output 1: *Revegetation packages for different ecosystems under different ecological and socio-economic regimes developed*: In order to enhance the area of operation of this concept, the revegetation packages that are suitable for varied agro-ecological conditions will be developed. This will be done keeping in view the socio-cultural and agro-ecological sensitivities of the area and the needs of the relevant stakeholders. The following activities will be undertaken to achieve this output:

1.1 Field studies to understand land availability, biodiversity and biomass status
1.2 Developing case studies to enhance the scope of the project outside the project area
1.3 Consultation workshops with various stakeholders
1 4 Development of a revegetation package for the Western Ghats region
1.5 Initiating policy and institutional studies

3.3.2 Output 2: *Integrated village ecosystem revegetation packages disseminated*: After developing the revegetation packages, it is important to effectively disseminate the models for large-scale adoption. The following activities will be undertaken to disseminate the packages:

2.1 Conduct awareness and motivation camps
2.2 Conduct extension and training programmes
2 3 Organize exposure trips
2 4 Prepare brochures for public display and newsletters
2.5 Use mass media and electronic media for wide publicity
2.6 Organize meetings with media and policy makers

2.7 Conduct training workshops on 'Integrated Village Ecosystem Revegetation Guidelines' for the Forest Department, NGOs, people's representatives and other development departments

***3.3.3 Output 3:** Approach and methodology for monitoring biodiversity and carbon flows in forestry projects developed*: Apart from developing revegetation methods for enhancing biodiversity and biomass in the village ecosystem, monitoring of biodiversity and carbon flow, needs to be developed to undertake timely and adaptive resource management. The following monitoring activities will be undertaken under this output.

3.1 Literature survey for methods and manuals for biodiversity and carbon flow monitoring
3.2 Technical workshop organized for discussion of methodology
3.3 Development of methodology and manuals for monitoring
3.4 Organize training programmes
3.5 Initiate studies to test the approach developed for monitoring carbon and biodiversity

3.4 Objective 4: To develop sustainable participatory institutions and build capacity

To sustain the enhanced carbon sink and biodiversity, there is a need for institution development at the village level as well as in the Forest Department. The project proposes to develop institutions and build capacity among all the stakeholders.

***3.4.1 Output 1:** Effective institutions developed*: Institutions that continue to manage forest resources even after the project support should be developed for the sustenance of carbon sequestration and biodiversity. Therefore the following activities are to be undertaken:

1.1 Assess existing institutional structures
1.2 Workshops with communities and Forest Department personnel for reforms in the institutions
1.3 Implement the package so developed
1.4 Form Self-Help Groups or strengthen existing ones.
1.5 Provide linkages with other financial institutions to enhance the future sustenance of the institutions.
1.6 Capital asset building of village institutions

***3.4.2 Output 2:** Effective community participation ensured*: Effective community participation has to be ensured in order to make the institutions function effectively. The following activities are expected to ensure greater participation of communities in institution-building and sustenance.

2.1 Identification of training needs for different stakeholders
2.2 Imparting training for field surveys
2.3 Leadership and contact leader programmes
2.4 Training the community in technical packages
2.5 Training local community in Non-Wood Forest Product processing, marketing, and water-harvesting technologies
2.6 Impart skill training to local communities for maintenance and repair of biogas units and cookstoves

2.7 Training and involvement of women in planning and management of homesteads

3.5 Objective 5: Participatory Monitoring for Biodiversity Conservation

There are two issues involved in this objective. As the project stipulates, a project monitoring and evaluation will be undertaken to assess the project's performance. On the other hand this objective also envisages enhancing the preparedness of the community to undertake monitoring and evaluation of their village ecosystem resources so that local resources can be effectively managed. Such experiments will also help the local community to initiate adaptive resource management strategy for effective resource use. The following activities will ensure that the objectives are achieved.

1.1 Develop methodologies and prepare guidelines and manuals
1.2 Identify parameters and groups for monitoring,
1.3 Organize training workshops to assess the guidelines prepared and conduct training programmes
1.4 Monitoring activities
1 5 Prepare and publish periodic reports
1.6 Village level meetings for sharing information and findings

4. RISKS AND SUTAINABILITY

4.1. Risks and mitigation measures

The proposed project involves participation and coordination of various stakeholders such as farmers, women, households, local communities, school management committees, Forest Department, NGOs and other relevant government departments. Such a project involving large number of stakeholders and long gestation period for obtaining benefits would involve risks such as failure of stakeholders to participate in the revegetation programme, protection of revegetated lands, adoption of sustainable extraction practices and the absence of a market for the processed plant products. Such risks could be mitigated through enabling and participation of local communities and ensuring sustained and enhanced flow of benefits. Some of the potential risks and mitigation measures are given in Table 1.

Table 1: Potential risks and mitigation measures.

Risks	Level of risk	Mitigation measures
Non-participation of different stakeholders	Medium	- Empowerment of village communities and respective stakeholders and their participation in all decision-making processes - Awareness creation and transparency in functions of different institutions - Enhanced biomass resource supply
Low regeneration rates and productivity of revegetated lands	Medium	- Distribution of good quality seedlings - Effective soil moisture conservation measures
Lack of community preparedness for revegetation	Low	- Supply of species of local choice - Training programmes for capacity building
Lack of demand for biomass resources and processed products	Medium	- Market infrastructure development and creation of market linkages
Lack of policy support	Low	- Awareness workshops for policy-makers - Demonstration of successful implementation and enhanced flow of benefits

4.2 Sustainability of the Project

The project aims at sustaining the carbon sinks created, biodiversity conserved and enhancing the income of the people. The critical issue is sustaining the participation of the stakeholders Three key factors that will determine the long-term sustainability of the project are:

- Sustained flow of economic benefits from revegetated lands.
- Enabling, empowerment of capacity development of local communities.
- Legal and policy support from the government.

Project implementation includes dedicated activities to sustain the resources created as well as the participation of local communities. The project's sustainability will be ensured by the following:

1. *Institutional and social factors*

- Strong participatory institutions developed during the project will have the capacity to continue managing the ecosystem's resources.
- Women will be the primary beneficiaries with increased availability and access to diverse forest products. Women's groups created under the project are likely to ensure sustainability of the activities to ensure flows of benefits.
- The Forest Department and NGO's will create appropriate institutions, policies and incentives to enable project sustainability.

2. *Economic factors*

- Regeneration and planting of economically valuable tree and non-tree species, will provide forest products and income, creating a stake for the community to protect and manage the vegetation resource
- Biodiversity and carbon sequestered in trees on farmlands, around temples and water bodies are unlikely to be felled, sustaining the local benefits
- Marketing and processing facilities created for value addition

3. Legal and policy support

- Commitment of the government, particularly the Forest Department for a participatory approach to forest protection and management.
- Increased awareness of biodiversity conservation and synergy between local and global benefits

4.3 Replication of the Integrated Village Ecosystem Revegetation Concept

The project aims to disseminate the integrated village ecosystem revegetation concept to other regions of the Western Ghats, covering nine districts in Karnataka state and many more in the states of Goa, Kerala, Maharashtra and Tamilnadu. However, the immediate focus will be on the Western Ghats districts of Karnataka. Dissemination of the package also requires policy support and funding from the State Forest Department, Government of Karnataka and Government of India. Replication of the project concept to other regions of Western Ghats will be facilitated by the following:

- Successful implementation and demonstration of the enhanced flow of incomes from the village ecosystem revegetation programme
- Preparation of representative socio-economic-stakeholder-specific revegetation package.
- Intensive institution development and capacity-building activities implemented in the Western Ghats region as part of the project activities.
- Involvement of Forest Department and NGOs in implementation of the project so that replication in other areas is likely
- Organizing training workshops for different stakeholders in the adjoining areas, policy makers and creating awareness for the public at large with the help of mass media programmes and exposure tours.
- Preparation of policy papers

5. STAKEHOLDER PARTICIPATION AND IMPLEMENTATION ARRANGEMENT

The project was conceived in consultation with various stakeholders to develop a comprehensive integrated village ecosystem revegetation package Participatory rural appraisal methods were adopted to ensure effective participation of different stakeholders.

5.1 Participation of stakeholders

Local Communities: Local communities were involved while preparing the land-use category maps of the village, the species choice for different land-use categories and in the overall development of the biomass resources of the village. Initially participatory rural appraisal (PRA) was conducted to give an overview of the project and seek participation of local communities in implementing the project. Later, when the land and household survey was complete, the local communities were consulted to know the willingness of the people to protect and manage the forest and non-forest lands belonging to different stakeholders of the village Further, strategies to protect and manage different land categories were also discussed. A revegetation package was developed for each land category by involving the relevant stakeholders; farmers for cropland, households for homesteads, temple committees for temple land, water management committees for water bodies, village assemblies for common lands and so on.

Women: Meetings with women were conducted separately in order to understand the strategies for revegetation package for homestead gardens and common lands. Further, the species choices for different land use categories were also discussed to document the differences in preference, if any, with respect to species choice and protection measures.

Forest Department: The Forest Department officials were involved from the beginning at all stages; selecting the sites, villages and the strategies for project implementation. The Forest Department's front line staff was involved while drawing up strategy for protection and management of the different land-use categories with the people.

NGOs, Village Forest Committees and other academic institutions: The NGOs, Village Forest Committees and researchers were also involved in order to seek their suggestions regarding the approach and implementation strategies. A series of consultative meetings was conducted to involve NGOs, for consultation, data collection, project formulation and documentation. The Indian Institute of Science and Forestry College, University of Agricultural Sciences, Sirsi, were involved in the field studies and consultations.

5.2 Project Implementation Arrangement

The institutional framework for full project implementation is given in Figure 1. The project executing agency will be the Karnataka Forest Department (KFD), along with the Forest Development Agency (FDA) at the forest division level.

Project implementation involves the participation of the Karnataka Forest Department, Forest Development Agency, Zilla Parishad, NGOs and the Village Forest Committees. A Project Management Cell will implement and mange the project. As shown in the figure, the Project Management Cell at Sirsi will receive funds from the GEF and other bilateral agencies. The Project Management Cell at Sirsi will implement the project through Forest Development Agency at forest division level, with the assistance of NGOs, Village Forest Committees, Zilla Parishads, research institutions and so on, monitor progress, and report the achievements, problems and lessons to the respective funding agencies.

- **Project Steering Committee**: A project Steering Committee chaired by the Principal Forest Secretary of the Government of Karnataka will provide guidance, support and take broad decisions on project implementation and management. The members of the Steering Committee include the Principal Chief Conservator of Forests of the Karnataka Forest Department, the Chief Conservator of Forests, an NGO representative, one representative from the Village Forest Committee of Uttara Kannada, Secretaries from various developmental departments such as the Ministry of Agriculture, Ministry of Rural Development, Zilla Parishad etc. The member secretary will be the Conservator of Forests, Kanara Circle. The Conservator of Forests, Kanara circle will be the Project Director. The Project

Director will also be a member of the committee. The main functions of the committee will be to:

- Provide broad guidelines to the Project Management Unit (PMU) and take policy decisions
- Provide directives/guidelines on various project activities,
- Ensure that the goals of the project are achieved,
- Coordination and support to Project Management Unit with government departments and other stakeholders,
- Monitor the strategic results to strengthen the impacts of the project
- To facilitate policy level changes that may be necessary for implementation of the project concepts on a large scale.

The Project Steering Committee will meet once every year or as desired by the Chairperson. The Project Director will report on the programmes, plans and progress of the project to the Steering Committee periodically. The Project Management Unit will delegate and authorize a sub-committee chaired by the Project Coordinator to take all the executive decisions such as identification of experts, institutions, recruitment of staff, procurement of equipment etc.

- **Project Management Unit**: The Project Management Unit will be located at the Office of the Conservator of Forests, Kanara Circle for overall coordination of the project.

- **Project Director**· The Conservator of Forests, Kanara circle will be the Project Director, and his primary responsibility will be to provide broad guidelines for project activities. The Director would report the progress to the Steering Committee. He will also ensure the support of the Forest Department and various developmental departments to the project at the district level.

- **Project Monitoring Cell**: The Project Monitoring Cell will be the executive body of the project, taking guidance from the Project Director and the Steering Committee, to plan, implement and monitor activities of the project The Project Monitoring Cell will receive funds directly from the funding agencies. The Project Monitoring Cell will be headed by the Project Coordinator, a senior forest officer, located at Sirsi and responsible for all the activities of the project. The Project Monitoring Cell will have a Secretariat to assist the Project Coordinator and four project officers of the rank of Deputy Conservator of Forests at the division level will assist the Project Coordinator. The main functions of the Project Monitoring Cell include:
    - Organize and supervise implementation, operation, monitoring and management
    - Financial management
    - Procurement of equipment, recruitment of staff in consultation with the project management unit
    - Coordinate with Zilla Parishad administration and NGOs
    - Selection of experts, NGOs, etc.
    - Develop guidelines for implementation and monitoring
    - Periodically report to the Project Director on the progress and problems
    - Prepare progress reports periodically, as required by different funding agencies

- **Project Coordinator** The Project Coordinator will head the Project Monitoring Unit and will coordinate with four project officers in different divisions for project implementation. The Project Coordinator will be assisted by the Secretariat of the Project Monitoring Unit and the project officers at the division level.

- **Project Officer:** Project officers will be the Deputy Conservator of Forests at the forest division level in Kanara Circle, where the project will be implemented. The project officers, apart from implementing the projects in the divisions, will be advised by the Forest Development Agency, a participatory institution.

- **Forest Development Agency**: The Forest Development Agency, a participatory institution will be chaired by the Conservator of Forests, Kanara circle. The Chief Executive Officer will be the Deputy Conservator of Forests. The other members of the committee include representative members from NGOs, Secretary of the Zilla Parishad, and adequate (at least five members) representation from the Executive Committees of various Village Forest Committees.

- **Village Forest Committee**: This is the participatory decision-making body at the village level. The Chairman of the elected representatives will head the Village Forest Committee. The Village Forest Committee will be assisted by the Forest Department, Zilla Parishad, NGOs and other consultants hired for the implementation of the project. The roles of the committee include:
    - Appraisal and monitoring
    - Preparation of a calendar of activities and implementation
    - Financial operations of non-forest activities
    - Consultation for activities in forest lands
    - Consultation for implementation in forest lands for maintaining quality
    - Maintenance of plantations after the second year

- **General Body of the Village Forest Committee**: This includes all the adult members of the village who will help in project planning and implementation. The planning and implementation includes:
    - Land-use planning for various land-use categories
    - Implementing the plan in non-forest lands
    - Protection of forests and other vegetation types
    - Fire and cattle management
    - Soil and water conservation
    - Biomass conservation measures, and
    - Vegetation management practices

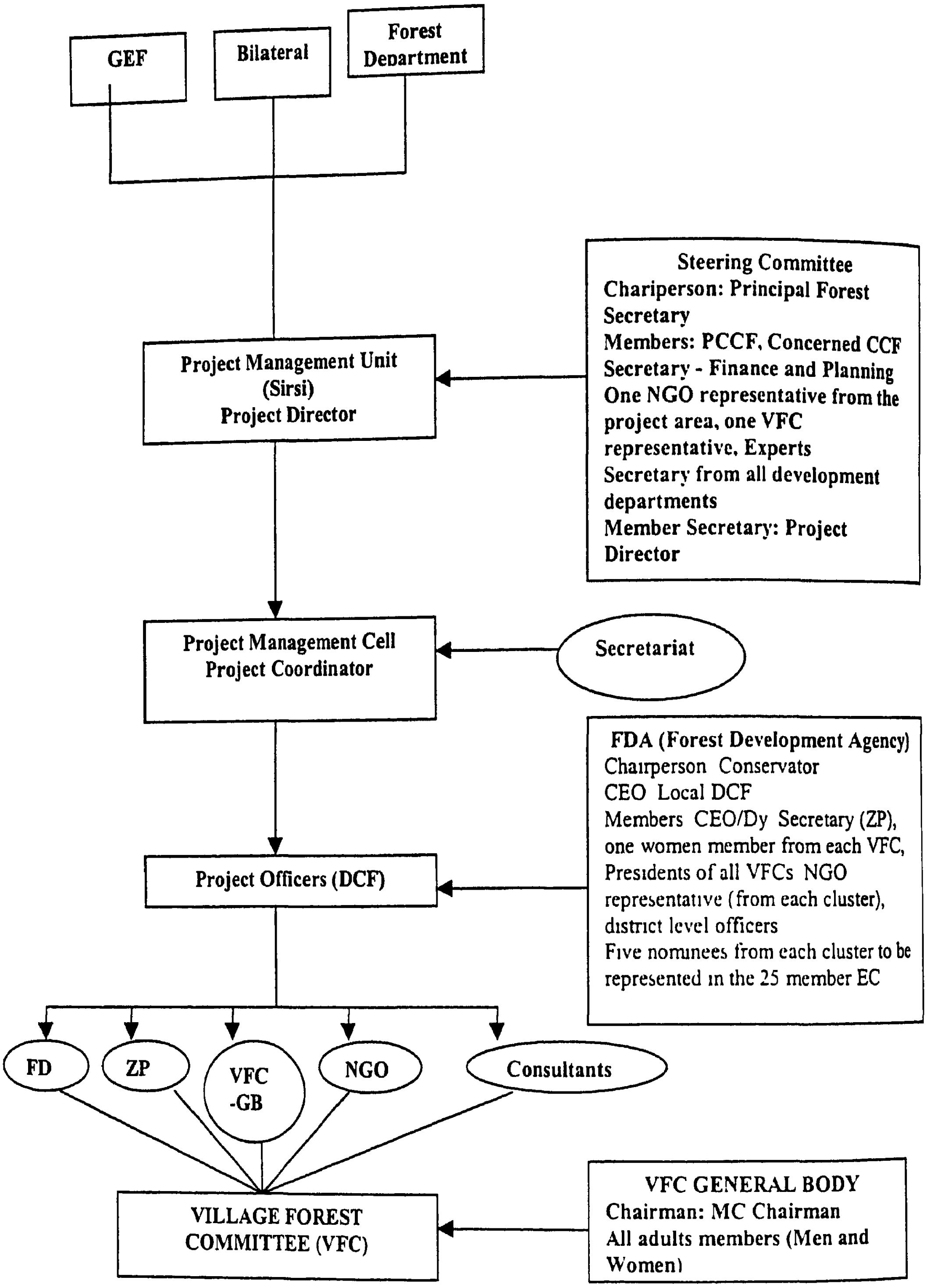

GEF
Bilateral
Forest Department
Steering Committee
Chariperson: Principal Forest Secretary
Members: PCCF, Concerned CCF
Secretary - Finance and Planning
One NGO representative from the project area, one VFC representative, Experts
Secretary from all development departments
Member Secretary: Project Director
Project Management Unit (Sirsi)
Project Director
Project Management Cell
Project Coordinator
Secretariat
FDA (Forest Development Agency)
Chairperson Conservator
CEO Local DCF
Members CEO/Dy Secretary (ZP), one women member from each VFC, Presidents of all VFCs NGO representative (from each cluster), district level officers
Five nominees from each cluster to be represented in the 25 member EC
Project Officers (DCF)
FD
ZP
VFC -GB
NGO
Consultants
VILLAGE FOREST COMMITTEE (VFC)
VFC GENERAL BODY
Chairman: MC Chairman
All adults members (Men and Women)

Figure 1: Implementation Arrangement

6. INCREMENTAL COSTS AND PROJECT FINANCING

6.1 Incremental Costs and Global Environmental Benefits – A Overview

The proposed GEF project aims at developing, implementing and disseminating an integrated village ecosystem revegetation package in the Western Ghats region to,

- Enhance and conserve the carbon sink
- Conserve biodiversity and
- Increase the biomass resource supply and flow of benefits

The project also involves capacity- and institution-building to sustain the local and global benefits. The innovative and incremental aspects of the project include;

- Revegetation of all land categories to increase the potential for local and global benefits,
- Enable and involve relevant stakeholders in all decisions on revegetation.

The GEF alternative aims to achieve these objectives and approaches at an incremental cost of Rs. 355 million (US $ 7.5 million). The baseline and incremental cost details are given in Annex A.

Broad Developmental Goals

The proposed project aims at enhancing local environmental and socio-economic benefits. The local environmental goals include: enhancing vegetation cover of all land components, leading to enhanced biodiversity, and soil and water conservation. The local socio-economic goals include increasing supply and access to diverse biomass resources and biodiversity; fuelwood, timber, grass and Non-Wood Forest Products (fruits, honey, gum, edible flowers, medicinal plants). Increased biomass resources meet the needs of households or farms, and provide raw materials for processing and marketing, leading to increased employment and income, particularly among women, rural artisans and the landless. The implementation of the proposed project will also lead to broader national objectives such as forest conservation, protection of watersheds, enhanced supply of timber, fuelwood and raw material for urban and industrial uses.

Baseline Scenario

The baseline scenario includes ongoing and projected activities under the State Forest Department programmes of forest conservation and afforestation. The features of baseline scenario activities are;

- Low rates of afforestation
- Dominance of fuelwood species in the afforestation programme, with marginal inclusion of Non-Wood Forest Product species.
- Forest development and afforestation programme largely restricted to degraded or open forests
- Degradation of biomass resources leading to decline in biodiversity
- Lack of capacity or institution development programmes

Under the current scenario, the local communities will face declining biomass resources and biodiversity. The carbon sink may decline in the project area due to increased pressure on forest and grazing land. Involvement of local communities is minimal and not sustained.

Costs: The baseline cost of forest development, which consists largely afforestation and insignificant level of training and capacity-building in the project area, is Rs. 65 million, over 5 years.

Benefits: The benefits are increased biomass supply, particularly fuelwood due to afforestation programme. The biomass generated is inadequate to meet the fuelwood demand and does not significantly contribute to meeting the Non-Wood Forest Product needs of leaf manure, grass, bamboo etc. The focus is only on degraded forest lands. Thus, the biomass and biodiversity of the non-forest land components is projected to decline.

Global Environmental Alternative

The GEF alternative aims at developing, implementing and disseminating an integrated village ecosystem revegetation plan through participatory approach to enhance the carbon sink (in vegetation and soil) and biodiversity and ultimately enhance the flow of biomass resource and benefits. The GEF incremental cost will support:

- Developing land category-stakeholder specific revegetation plan for all land components, considering the village as an ecosystem.
- Implementing the revegetation package to enhance carbon sink and biodiversity, in all land categories of village ecosystems.
- Developing participatory institutions and building capacity to sustain the revegetation plan.
- Developing ecosystem-specific integrated village ecosystem regeneration plans for different regions of the Western Ghats.

The incremental aspects of the GEF alternative are; consideration of all land components for revegetation, relevant stakeholder participation for planning and implementation of the revegetation plan, building strong participatory institutions to sustain local and global benefits.

Costs: The GEF alternative is estimated to cost Rs. 420 million The incremental cost is Rs. 355 million, of which the GEF is expected to contribute Rs. 289 million to achieve the global objectives.

Benefits: The implementation of the GEF alternative will lead to local as well as global benefits The incremental local benefits include; enhanced bio-resource supply and access to biodiversity, increased employment and income generation, and soil and water conservation contributing to increased crop productivity The critical global benefits justifying the incremental costs are; conserving the existing forest carbon sink, enhancing the carbon sink in forest and non-forest land components and conserving biodiversity, in a sustainable manner by creating a stake for local communities as well as the Forest Department.

6.2 Budgeting and Contribution of Different Agencies

The major budget components and the contribution of different agencies to the total budget is given in Table 2 The total budget of the project for the five components is Rs. 420 million The GEF's contribution is projected to be Rs. 289 million, with the State Forest Department contributing about Rs. 65 million towards baseline activities. Bilateral contribution is projected to be Rs 55 million. The communities are expected to contribute in kind in the form of labour to some activities and pay partially for the cost of quality seed material of commercially-valuable species.

Table 2: Project Budget and Contribution of Different Agencies (in Rs. Million)

Component	Total	Contribution of			
		GEF	Forest Department (Baseline)	Bilateral	Community
Objective 1: To enhance carbon stock and biodiversity in different land components of village ecosystems in the Western Ghats region	217	132	50	25	10
Objective 2: To enhance bio-resource supply to village communities to improve incomes and livelihoods	78	57	5	15	1
Objective 3: To develop and disseminate integrated village ecosystem revegetation package to different regions of the Western Ghats	75	65	5	5	-
Objective 4: To develop sustainable participatory institutions and build capacity	40	25	5	10	-
Objective 5: Participatory monitoring for biodiversity conservation	10	10	-	-	-
Total Budget (Rs. million)	**420**	**289**	**65**	**55**	**11**
BUDGET in US $ million	**8.9**	**6.15**	**1.38**	**1.17**	**0.234**

1 US $ = Rs. 47 00

7. MONITORING AND EVALUATION

The project planning, consultation or participatory process, implementation, protection and management, changes in carbon sink and biodiversity and flow of benefits will be subjected to multiple levels of monitoring and evaluation. The monitoring and evaluation will involve the following.

- Changes in biodiversity in different land components
- Changes in carbon sink, measured in terms of carbon density (tons of carbon per ha) in vegetation and soils of different land components
- Estimating the growth rates of biomass
- Participatory monitoring of extraction and use of biomass resources

- Financial accounting; rate of utilization of funds, expenditure and benefit flows
- Capacity enhancement of communities; extent of participation of stakeholders in different activities

One of the unique features of this project is the periodic monitoring by stakeholders of vegetation status, change and flow of benefits. The stakeholders will be trained to monitor, analyze and report their findings to the village committee as well as to the project authorities.

The Project Monitoring Unit and the Forest Development Agency will periodically monitor various aspects of project implementation. The Project Monitoring Unit will prepare periodic reports and present the monitoring reports to the Steering Committee, Forest Development Agency and also share them with the GEF, UNDP and State Government. In addition to periodic project monitoring, mid-period and project-end evaluation by external agencies is planned.

REFERENCES

FSI, 1997, State of Forest Report 1997, Forest Survey of India, Ministry of Environment and Forests, Dehradun. India.

FSI, 1999, State of Forest Report 1999, Forest Survey of India, Ministry of Environment and Forests, Dehradun. India.

Bawa, K. S. and S Menon, S., 1997 Applications of Geographic Information Systems (GIS), remote-sensing, and a landscape ecology approach to biodiversity conservation in the Western Ghats. Current Science (Special issue on Western Ghats - Biodiversity and Conservation) 73. 134-145.

Ravindranath, N H., Sukumar, R., and Deshingkar, P., 1997, Climate change and forests: impacts and adaptations, Stockholm Environment Institute, Stockholm, Sweden.

ANNEXURES

A. Incremental cost matrix
B. Logical framework matrix
C. Carbon sink enhancement
D. Map of project area
E. Sampling framework
F. Features of selected village ecosystems
G. Revegetation package for a sample village
H. Biodiversity and carbon stock in major land use categories for three sample villages in three ecosystems

1 US$ = Rs 47.00

Project Activities	Baseline	Alternative	Increment
Objective 1: To enhance carbon stock and biodiversity in different land components of village ecosystems in the Western Ghats region	- Revegetation only on forest lands - Low biodiversity in reforested areas due to promotion of high-yielding exotic species - Low biomass production in agro-ecosystems and other land-use elements of the village due to low rate of planting and low quality seedlings and inadequate soil moisture conservation measures - Inappropriate silvicultural packages - Lack of integrated approach for village biomass resource development	- Revegetation on forest as well as all non-forest lands - Promotion of polyculture and native species - Innovative silvicultural interventions, including soil moisture conservation measures, to enhance productivity - Active participation of communities in planning, implementation and management - Integrated, site and stakeholder-specific and resource enhancement plans adopted	- All land categories revegetated - Enhanced carbon sink in village ecosystems - Enhanced biodiversity in village ecosystem
	Cost: Rs. 50 million	**Cost: Rs. 217 million**	**Cost: Rs. 167 million**
Objective 2: To enhance bio-resource supply to village communities to improve incomes and livelihoods	- Inadequate biomass supply - Low returns from agriculture and animal husbandry - Inefficient use of land, biomass and water resources - Insignificant income and employment generation - Processing and marketing of Non-Wood Forest Product resources not developed	- Enhanced biomass supply - Alternative livelihood systems provided - Sustainable use of biomass resources - Improved income and employment generation - Value addition and enhanced market potential for Non-Wood Forest Products	- Meeting diverse biomass needs sustainably - Increase income and stake in biodiversity - Value addition and economic activities sustain community participation
	Cost: Rs. 5 million	**Cost: Rs. 78 million**	**Cost: Rs. 73 million**
Objective 3: To develop and disseminate an integrated village ecosystem revegetation package to different regions of the Western Ghats	- No integrated ecosystem revegetation package available - Limited information and awareness of technical packages - Existing extension strategy for dissemination is inadequate - Poor documentation of experiences and lesson learnt - Lack of case studies	- Develop region-specific participatory packages - Enhanced awareness of technical packages - Development of extension strategies - Extensive documentation - Case studies developed	- Integrated village ecosystem revegetation package developed and disseminated
	Cost: Rs. 5 million	**Cost: Rs. 75 million**	**Cost: Rs. 70 million**

Objective 4 To develop sustainable participatory institutions and build capacity	- Inadequate community participation in planning, implementation and management - Institutions are not empowered - Linkages with other development departments weak - Training imparted only to Committee presidents and few members of the management committee - Inadequate capacity-building	- Involve community to plan, implement and manage the village ecosystem - Empower the institutions to undertake ecosystem management - Involve various development departments to enhance resource base of villages - Enhance technical training to village communities, all stakeholders - Build capacity of village community, NGOs and forest department for efficient management of village resource and participatory approaches	- Community participation enhanced - Decentralized management of local resources - Technical capacity of local villages enhanced - Sustaining institutions
	Cost: Rs. 5 million	**Cost: Rs. 40 million**	**Cost: Rs. 38 million**
Objective 5: Participatory monitoring for biodiversity conservation	- No information to local communities on vegetation status and change - Evaluation is done only at the end of project by external agencies - No monitoring process for adaptive management of vegetation - No internal monitoring	- Periodic monitoring and reports - Participatory monitoring for adaptive management; extraction, protection, etc - Information to communities on revegetation	- Adaptive vegetation management adoption - Awareness among local communities on vegetation - Sustaining vegetation regeneration
	Cost: Rs. 0.00	**Cost: Rs. 10 million**	**Cost: Rs. 9 million**
Domestic benefits	- Revegetation focused only on degraded forest lands - Lack of integrated village ecosystem management plans has led to inadequate supply of biomass, resulting in insignificant income and employment generation - Lack of village level institutions managing forest and non-forest resources	- Sustained bio-resource supply through integrated village ecosystem plans - Enhanced opportunities for income generation and employment - Village level institutions developed for managing the resources in a sustained way - Village ecosystem revegetation approach; considering all land categories	- Enhanced biomass and biodiversity for various needs of the local community - Increased employment opportunities - Improved quality of life and livelihood systems - Institution and capacity building
Global benefits	- Lower rates of carbon sequestration - Less emphasis on biodiversity conservation and promotion - Emphasis on fuelwood plantations - Land degradation	- Enhanced carbon sinks - Biodiversity promotion - Prevention of land degradation	- Creation of enhanced carbon sinks - Enhancing biodiversity - Halting land degradation
Costs	**Rs. 65 million (US $ 1.38 million)**	**Rs. 420 million (US $ 8.9 million)**	**Rs. 355 million (US $ 7.5 million)**

Annexure B: Logical Framework Matrix

	Verifiable indicator	Verifier	Critical Assumption
Global Objective: To enhance carbon sinks, biodiversity and sustainable livelihoods through integrated village ecosystem revegetation approach in the Western Ghats region	- Sustainable livelihoods created - Increase in employment and income - Enhanced carbon density - Enhanced biodiversity	- % growth in income and employment - Tons of carbon sequestered under revegetation plan (over baseline carbon density) - Biodiversity index	- Policy support for integrated village ecosystem revegetation approach and programme - Local communities willing to participate in the revegetation programme - Projected growth rates realized - Demand for Non-Wood Forest Products
Objective 1: To enhance carbon stock and biodiversity in different land components of village ecosystems in the Western Ghats region	- Enhanced biomass - Enhanced biodiversity	- Biomass estimation - MAI estimation - Satellite imageries - Soil carbon content - Biodiversity index	- Policy support to integrated village ecosystem revegetation approach continues
Out put 1: *Revegetation package developed through participatory planning* **Activities** 1.5 Field survey of project villages such as land survey, soil and hydrological survey, household survey to develop village resource maps 1.6 Develop carbon and vegetation biodiversity maps of the village 1.7 Prepare a comprehensive resource use and resource development plan for the villages through participatory appraisal 1.8 Develop location (land category) and stakeholder-specific revegetation plan for each village	- Revegetation plans prepared - People's participation enhanced - Site specific package developed - Package implemented - Quality of plans implemented	- Number of plans prepared - Number of plans implemented - Number of people involved in planning - Number of land elements identified and afforested	- Decisions are cleared in-time - Infrastructure is provided - Livestock population remains same - No epidemics (pest and diseases) - Timely release of funds
Out put 2: *Carbon sink and biodiversity of village ecosystems conserved and enhanced·* **Activities** 2.1 Establishment of nurseries for increasing the distribution of quality seedlings 2.2 Land preparation and soil moisture conservation measures undertaken in all land categories 2.3 Distribution of quality seedlings such as clones, grafts for planting 2.4 Planting in forest and non-forest land categories 2.5 Protection of forests and after care 2.5 Promotion of natural regeneration in natural forests 2.6 Organization and infrastructure development for effective management of forest and non-forest resources	- Natural regeneration promoted - Plantations developed - Enhanced regeneration - Reduced grazing - Reduced illicit harvesting - Reduced fire frequency	- Area/extent of afforestation - Survival % - Productivity (MAI, CAI) - Regeneration % - Fire sensitive species regenerating - Productivity - Grazing/fire intensity	- Enhanced growth realized

Objective 2: To enhance bio-resource supply to village communities, leading to improved incomes and livelihoods	- Enhanced household income	- % change in household income - % reduction in fuelwood gathering time	- Projected regeneration and growth rates realized - NWFP enterprises remain profitable
Output 1: *Sustainable extraction package for fuelwood and Non-Wood Forest Product extraction prepared* **Activities** 1 1 Developing sustainable management (extraction) practices package 1 2 Training community for sustainable extraction of fuelwood and Non-Wood Forest Products	- Change in biodiversity - Change in number of cut stems - Enhanced capacity of community to use forests sustainably	- Reduced density of cut stems - Increased species number - Number of training programmes conducted - Number of villagers attending - Package manual prepared	- Sustained demand for Non-Wood Forest Products - Communities adopt sustainable extraction methods
Output 2 *Employment and income enhanced* **Activities** 2 1 Assessment of Non-Wood Forest Product processing potential 2 2 Assessment of market infrastructure 2 3 Development of market network 2 4 Processing facilities for Non-Wood Forest Products and medicinal plants to add value 2 5 Enhancement of milk production through improved cattle management	- Enhanced income and contribution to savings - Value addition enterprises installed - Increased access to market - Shift to stall feeding	- Change in income - Self-help groups initiated - Participation in self-help groups - Number of enterprises initiated - Market surveys conducted - Number of households shifting to stall feeding - Quality of NWFP marketed	- Marketing infrastructure in place - Policy and government support to NTWP rights to community
Output 3: *Quality of life improved and alternative livelihood systems provided* **Activities** 3 1 Evaluation of current fuelwood consumption patterns 3 2 Installation of biogas plants 3 3 Installation of fuel-efficient stoves and promotion of renewable wood substitutes 3 4 Evaluation of current grazing systems and provision of alternatives	- Time spent for collection of forest produce reduced - Energy saving devices installed - Increase in milk production - Time saved from reduced fuelwood gathering	- % time spent for collection of forest products - Number of energy saving devices installed - Milk yield - Hours spent in gathering wood	- High performance of efficient stoves - Effective alternatives for grazing and fuelwood extraction developed - Farmers adopt stall feeding practice
Objective 3: To develop and disseminate integrated village ecosystem revegetation package to different regions of the Western Ghats	- Adoption of integrated village ecosystem revegetation package in Western Ghats region	- Reports on rate of spread	- Projects lessons are available - Policy support realized
Output 1: *Revegetation packages for different ecosystems under different ecological and socio-economic regimes developed* **Activities** 1 1 Field studies to understand land availability, biodiversity and biomass status 1 2 Developing case studies to enhance the scope of the project outside the project area 1 3 Consultation workshop with different stakeholders 1 4 Development of revegetation package for the Western Ghats region 1 5 Instituting policy and institutional studies	- Ecosystem specific revegetation packages prepared - Database for different Ecosystems developed - Case studies developed - Workshops organized - Policy and institutional studies initiated	- Number of reports prepared - Number of databases developed - Number of case studies developed (both successes and failures) - Number of policy studies completed	- Successful ecosystem packages tested - Participation of different stakeholders

disseminated **Activities** 2 1 Conduct awareness and motivation camps 2 2 Conduct extension programmes and training programmes 2 3 Organize exposure trips 2 4 Prepare brochures for public display and newsletters 2 5 Use mass media and electronic media for wide publicity 2 6 Organize meetings with media and policy makers 2 7 Conduct training workshops on "Integrated Village Ecosystem Revegetation Guidelines" to Forest Department NGOs, People's representatives and other developmental departments	- Adoption of integrated village ecosystem revegetation approach - Awareness built - Training programmes organized - Policy workshops conducted	- Number of integrated village ecosystem revegetation approach attempted in areas other than the project locality - Number of motivation camps conducted - Number of training programmes conducted - Number of brochures developed and distributed - Number of mass media programmes developed - Number of meetings held with policy makers - Response of viewers to documentaries	- Policy support for promoting integrated village ecosystem revegetation package is in place - Stakeholder interest sustains - Funding available from Forest Department
Output 3: *Approach and methodology for monitoring biodiversity and carbon flows in forestry projects developed* **Activities** 3 1 Literature survey for methods and manuals for biodiversity and carbon flow monitoring 3 2 Technical workshop organized for discussion of methodology 3 3 Development of methodology and manuals for monitoring 3 4 Organize training programmes 3 5 Initiate studies	- Approach paper for forestry projects developed - Manuals prepared - Workshops organized - Carbon flow and biodiversity estimated	- Number of technical workshops organized - Monitoring reports prepared - Training programmes organized - Number of manuals prepared - Number of locations where monitoring was initiated - Monitoring reports	- Willingness to learn from field
Objective 4: To develop sustainable participatory institutions and build capacity	- Financially viable institutions developed - Continued post project activities	- Balance sheets of communities - Product inventory - Number of resolutions and discussion implemented	- Continued policy support for participatory approach - Interest of stakeholders continued - Stability of macro economics
Out put 1: *Effective institutions developed* **Activities** 2 1 Assess existing institutional structures 2.2 Workshops with communities and Forest Department personnel for reforms in the institutions 2.3 Implementation the package so developed 2 4 Form self help groups or strengthen existing self help groups 2 5 Providing linkages with other financial institutions to enhance the future sustenance of the institutions 2 6 Capital asset building of village institutions	- Enhanced capacity of local institutions to manage local resources - Formation of self help groups - Improved linkages with financial institutions - Fund position - Workshops organized	- Number of training programs conducted - Number of camps/exposure trips conducted - Number of people availing assistance from financial institutions - % growth in savings	- Policy support for benefit sharing - Policy for support activities

Out put 2. *Effective community participation ensured* Activities 2 1 Identification of training needs for different stakeholders 2 2 Imparting training for field surveys 2 3 Leadership and contact leader programmes 2 4 Training community in technical packages 2 5 Training local communities in Non-Wood Forest Product processing, marketing and water harvesting technologies 2 6 Impart skill training to local communities for maintenance and repair of biogas units and cookstoves 2 7 Training and involvement of women in planning and management of homesteads	- Activities undertaken post – project period by the institutions formed - Training needs identified - Enhanced technical capacity of villagers - Improved maintenance skill of biogas plants - Active involvement of women in management of homesteads - Training packages developed - Manuals prepared - Enhanced women participation - Decisions taken and implemented	- Number of activities/ meetings conducted after the project period - Number of training programmes conducted - Number of training programmes on technical capacity - Number of training programmes held on various skills - Number of training programmes conducted on homestead management - Number of training packages prepared - Number of manuals prepared - Women members participating in meeting	
Objective 5: Participatory monitoring for biodiversity conservation	- Monitoring of biodiversity, benefits	- Number of villages in which monitoring has been completed - % of villages with local men and women participating actively in monitoring	- Communities willing to participate - Data generated is useful to communities
Output 1: Biodiversity conservation due to participatory management **Activities** 1 1 Develop methodology and prepare guidelines and manuals 1 2 Identify parameters and groups for monitoring 1 3 Organize training workshops to assess the guidelines prepared and conduct training programmes 1 4 Monitor activities 1 5 Prepare and publish periodic reports 1 6 Village level meetings for sharing information and findings	- Parameters for monitoring identified - Groups for monitoring identified - Groups trained - Reports published - Decisions taken based on findings - Manuals prepared	- Number of groups identified - Number of groups trained for monitoring - Number of groups monitoring - Number of monitoring reports - Number of village meetings held	

Annexure C: Carbon Sink Enhancement

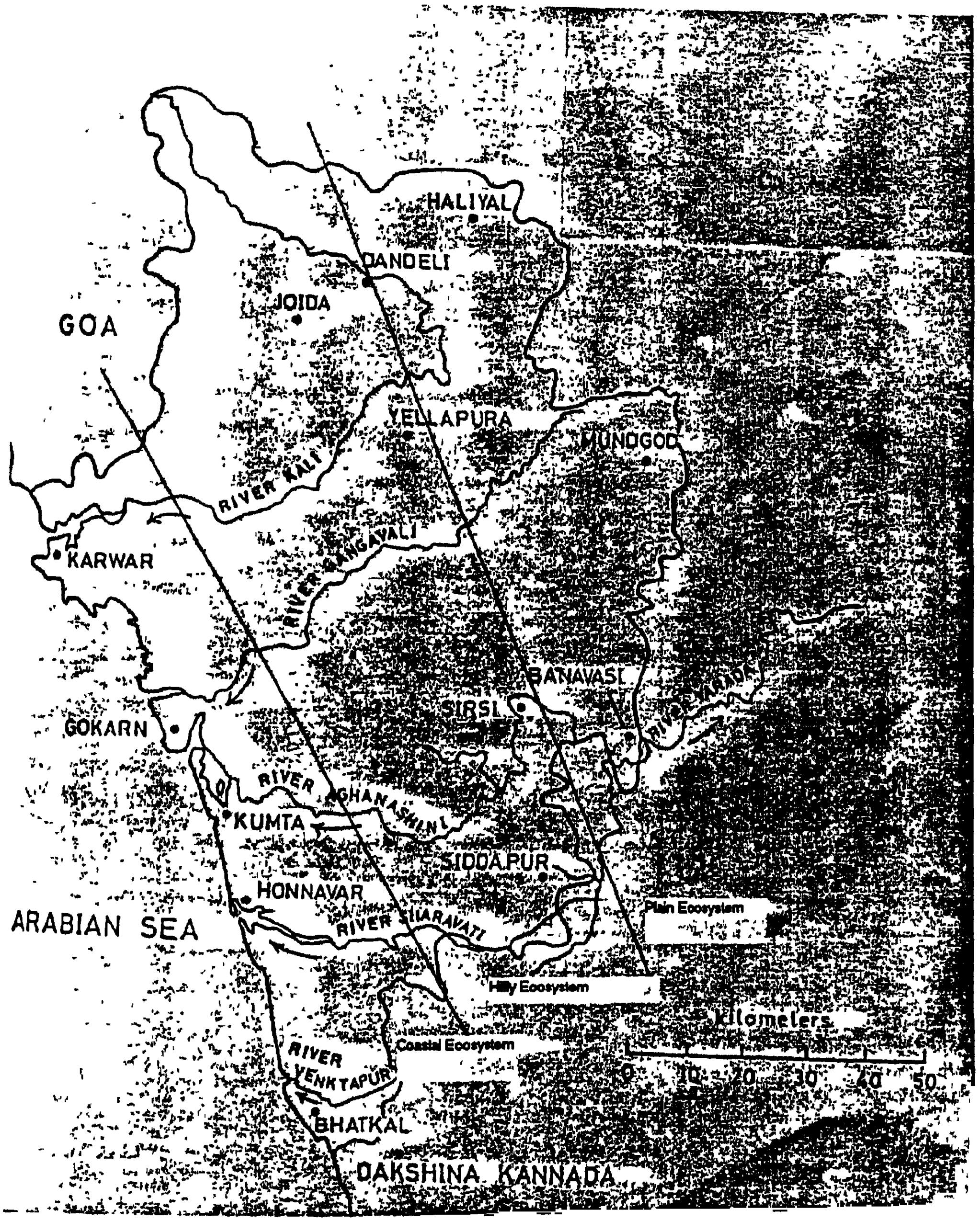
he carbon sink in the forest and non-forest (excluding intensively managed crop and garden land) ategories is subjected to degradation and loss due to land-use change, non-sustainable extraction of omass, over-grazing and so on. Under the proposed project, revegetation is planned for all forest and non-est land categories Further, sustainable extraction practices will be adopted. The integrated approach to vegetation and local institution and capacity building will lead to conservation of existing carbon sinks and arbon sequestration in vegetation and soil, ultimately enhancing the carbon sink in the project area. The cremental carbon sink in the project area (39 061 ha of geographical area) in 25 years is estimated to be 8 million tons.

Carbon Emission avoided and sequestered

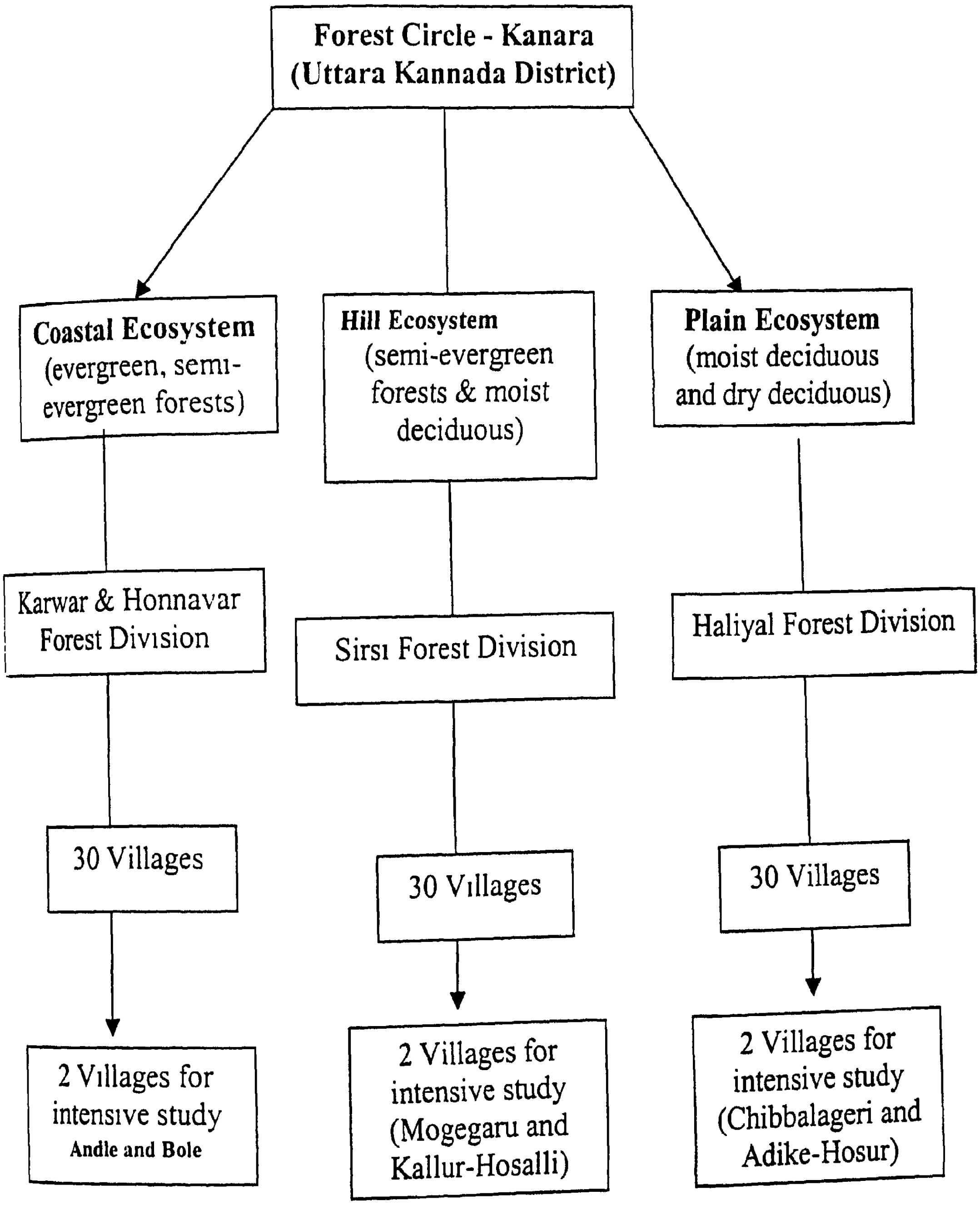
Land use categories	Area (ha)	Baseline carbon stock (t/ha)			GEF alternative projected carbon stock (t/ha)			Carbon increment (t/ha)
		Above ground	Soil	Total	Above ground	Soil	Total	
Agricultural land	350	33 990	105	34 095	148 515	14 852	163 367	129 271
Forest - Good	1000	47 765	700	48 465	103 57.5	48 304	58 661	10 196
Forest - Less Degraded	2 000	74 000	1 400	75 400	99 005	29 702	128 707	53 307
Forest - Degraded	7 000	149 135	4 900	154 035	747 015	74 702	821 717	667 682
Home gardens	150	5 463	105	5 568	43 505	30 454	73 959	6 8391
Schools	100	25	30	55	126 015	12 602	138 617	138 561
Ponds and tanks	100	3 095	30	3 125	126 015	12 602	138 617	135 492
Streams/rivers	300	7 644	210	7 854	144 015	14 402	1584 417	150 563
Temples	100	42	30	72	126 015	12 602	138 617	138 545
Plantations	2000	4 822	60	4 882	297 015	29 702	326 717	321 835
Total	**13 100**	**325 981**	**7 570**	**333 551**	**1 867 473**	**279 919**	**2 147 392**	**1 813 841**

ns of carbon sequestered per hectare	= 138 tC/ha
st of carbon sequestered	
vestment on hardware	= $ 2.54
tal investment	= $ 4.92

ANNEXURE D: Map of Project Area



ANNEXURE E: Sampling Framework


Forest Circle - Kanara (Uttara Kannada District)
Coastal Ecosystem (evergreen, semi-evergreen forests)
Hill Ecosystem (semi-evergreen forests & moist deciduous)
Plain Ecosystem (moist deciduous and dry deciduous)
Karwar & Honnavar Forest Division
Sirsi Forest Division
Haliyal Forest Division
30 Villages
30 Villages
30 Villages
2 Villages for intensive study Andle and Bole
2 Villages for intensive study (Mogegaru and Kallur-Hosalli)
2 Villages for intensive study (Chibbalageri and Adike-Hosur)

ANNEXURE F: Features of Selected Village Ecosystems

	Coastal ecosystem	Hill ecosystem	Plain ecosystem
Number of villages selected for the project	30	30	30
Villages selected for intensive study	2 (Andle and Bole)	2 (Kallur-Hosalli and Mogegaru)	2 (Chibbalageri and Adike Hosur)
Total population of all the villages	33 198	18 982	13 984
Number of households	6 025	3 023	2 254
Geographical area (ha)	12 248	16 535	10 278
Area under forest (ha)	5 485	10 904	4 825
Area under agriculture (ha)	3 196	4 192	4 550
Other land (ha)	3 567	1 439	903

ANNEXURE G: Revegetation Package for a Sample Village

Ecosystem Category	Area in ha (potential)	Revegetation System		Stakeholders Species Choice
		Model	Features	
Kushki-Bena Land (dry & grassland)	160 66 (25%)	Silvi-Pastural System	Grass Production cum timber & NTFP	Timber *Tectona grandis, Pterocarpus marsupium, Terminalia crenulata, Lagerstroemia microcarpa* NTFP *Garcinia indica, Mangifera indica (Appe midi), Artocarpus lackoocha, Mangifera indica, A heterophylla*
Leaf Manure Forest	11 94 (60%)	Foliage & Litter System	Manure cum fuelwood	Foliage *Aporosa lindleyana, Terminalia paniculata, P marsupium, T bellerica, S. cumini,* Fuelwood *Acacia sp, Casuarina sp, Eucalyptus sp*
Forest Land	412 52			
• Natural	(15%)	Enrichment & Gap Filling System	Bio diversity Promotion	Native *Mimusops elengii, A heterophylla, A hirsutus, C zeylanicum, G indica, Caryota urens, Calamus sp, Symplocos sp, Holigarna sp, Persea sp., Lagerstroemia sp*
• Degraded	(60%)	Block Plantation System	Soil & water conservation	Fuelwood *Acacia sp, Casuarina sp, Eucalyptus sp* Timber *T grandis, P marsupium, T crenulata, L microcarpa, D latifolia*
• Plantation	(25%)	Assisted Natural Regeneration System	Biomass production	NTFP *Vateria indica, A lakoocha, G indica* Native: *C arborea, B frondosa, T crenulata, T. bellerica, A lindleyana, P marsupium, L microcarpa*
Agroforestry				
• Paddy & Areca Boundary	160 66 (5%)	Silvi- Horti-Pasture System	Income and bio-mass generation	Forest *T grandis, Acacia sp, Casuarina sp, Sesbania sp, Acacia sp, Horti. M indica, A occidentale*
• Home Gardens	10 00 (30%)	Silvi-Horti System	Sustenance and livelihood	Horti· *M indica, A sapota, Citrus sp, , Murraya koenigii, Moringa olifera, M. champaka, A occidentale, P guajava, X rhetzii* Forest *A heterophyllus, S emarginatus, A lakoocha, T grandis, Plumeria alba, Acacia, Spondias pinnata*
nple Forest	2 83 (30%)	Conservation & Gap Filling System	Forest for cultural identity	*A lindleyana, S cumini, Mimusops elengii, L microcarpa, Aegle marmelos, E officinalis, A indica, Thevitia parviflora, M champaka, P alba*
ool Ground	1 62 (80%)	Aesthetic and Ornamental System	Beauty, fruits and shade	*P longifolia, Peltophorum sp, D regia, M champaka, A sapota, A heterophyllus, M indica, P guajava, S saman*
Road Sides	2 63 (60%)	Avenue Forestry	Shade and biomass	*V indica, T indica, F benghalensis, A heterophyllus, M champaka, S saman, D regia*
Water Bodies				
• Tank Bund & Foreshore	3.25 (50%)	Pond-Silvi System	Soil and water conservation	*S cumini, A heterophyllus, M indica, Acacia sp., T indica*
Stream Side	5.76 (30%)	Riverine System	Soil & biomass conservation	*M indica* (Appe midi), *Hopea sp, T crenulata, D indica, Vitex sp,*
ettlement rea	4 30 (70%)	Biomass System	Fuel wood and small timber	*Acacia sp., Casuarina sp, A heterophyllus, Eucalyptus sp., M indica, S emarginata*
remation round	1 20 (60%)	Gap Filling System	Biomass	*M indica, L microcarpa, T bellerica, S cumini*

te: Figures in parenthesis indicate afforestation potential area.

eholders Consulted· Farmers, landless labourers, artisans, school betterment committee, teachers, temple committee, youth ociation, woman's Self-Help Group.

ANNEXURE H: Biodiversity and carbon stock in major land-use categories for three sample villages in three ecosystems

Landuse category	Coastal ecosystem		Hill ecosystem		Plain ecosystem	
	Andle	**Bole**	**Mogagaru**	**Kallur-Hosalli**	**Chibbalageri**	**Adike-Hosur**
Agro-Ecosystem						
Number of species	13	50	85	67	47	35
Density/ha	95.6	160	926	205	402	149
Basal area/ha	3.22	7.88	185.18	12.08	53.1	26.88
Carbon stock (t/ha)	7.89	24.42	653.4	39.3	184.8	91.83
Homestead gardens						
Number of species	67	64	99	-	-	24
Density/ha	138.3	722	124.7	-	-	260
Basal area/ha	13.73	28.11	61.45	-	-	38.88
Carbon stock (t/ha)	45.15	96.17	214.45			134.4
Forest						
Number of species	43	10	55	8	30	20
Density/ha	258	112	262	106	239	600
Basal area/ha	9.54	2.62	18.2	7.15	5.1	19.44
Carbon stock (t/ha)	30.3	5.75	61.02	21.82	14.54	65.41
Private/privileged forests						
Number of species	23	5	54	40	26	-
Density/ha	578	80	564	308	804	-
Basal area/ha	5.92	9.12	9.14	17.47	16.8	-
Carbon stock (t/ha)	17.45	28.65	28.87	58.42	56.05	
Stream/river						
Number of species	43	50	20	81	23	-
Density/ha	38.4	100	28	264	237	-
Basal area/ha	2.1	4.93	2.4	17.9	26.52	-
Carbon stock (t/ha)	3.88	13.94	4.94	59.95	90.9	